

WHAT IS CLAIMED IS:

1. A method performed by a wireless communication system for managing multi-hop communications, the method comprising the steps of:

5 (a) receiving a request from an originating mobile terminal for initiating a call to a receiving mobile terminal;

(b) determining whether the originating mobile terminal can use multi-hop communication services;

(c) determining an operating mode of the originating mobile terminal for multi-hop communication;

10 (d) determining whether relaying can be provided by one or more relaying mobile terminals for multi-hop communication by the originating mobile terminal; and

15 (e) if the originating mobile terminal can use the services, the originating mobile terminal is in the default mode, and the relaying can be provided, establishing multi-hop communication between the originating mobile terminal and the system.

2. The method of claim 1, wherein step (b) includes the steps of:

(i) determining whether the originating mobile terminal has subscribed multi-hop communication services; and

20 (ii) if the originating mobile terminal has subscribed the multi-hop communication services, determining whether the originating mobile terminal is suitable for using the multi-hop communication services.

3. The method of claim 1, further comprising the step of:

25 if the originating mobile terminal is in a prompt mode for multi-hop communication, sending a prompt to the originating mobile terminal for selection of

the multi-hop communication services, along with information about incentives for using the services.

4. The method of claim 3, wherein step (e) includes the step of:

5 if the originating mobile terminal in the prompt mode selects the multi-hop communication services, allocating resources for setting up a multi-hop communication link between the originating mobile terminal and the system.

5. The method of claim 1, 2, 3 or 4, further comprising the step of:

10 after the multi-hop communication is completed, recording information relating to the multi-hop communication services for the originating and relaying mobile terminals in at least one of a home location register and a visitor location register.

6. The method of claim 5, further comprising the step of:

15 after the multi-hop communication is completed, sending discounted billing information to the originating mobile terminal and incentive information to the relaying mobile terminals.

20 7. The method of claim 3, further comprising the step of providing conventional communication services to the originating mobile terminal, if the originating mobile terminal cannot use multi-hop communication services, the relaying cannot be provided, or the originating mobile terminal in the prompt mode fails to select the multi-hop communication services.

8. The method of claim 3, further comprising the step of calculating the incentives to the originating mobile terminal based on statistical benefits resulting from at least one of an increase in system capacity and an decrease in overall interference.

25 9. The method of claim 3, further comprising the step of calculating the incentives to the originating mobile terminal based on the number of hops used to support the multi-hop communication link.

10. The method of claim 3, further comprising the step of calculating the incentives to the originating mobile terminal in accordance with actual traffic load conditions and interference for a predetermined time duration.

5 11. A method performed by a wireless communication system in response to a request from an originating mobile terminal for initiating a call to a receiving mobile terminal, the method comprising the steps of:

(a) determining whether the receiving mobile terminal can use multi-hop communication services;

10 (b) determining an operating mode of the receiving mobile terminal for multi-hop communication;

(c) determining whether relaying can be provided by one or more relaying mobile terminals for multi-hop communication by the receiving mobile terminal; and

15 (d) if the receiving mobile terminal can use the services, the receiving mobile terminal is in the default mode, and the relaying can be provided, establishing multi-hop communication between the receiving mobile terminal and the system.

12. The method of claim 11, wherein step (a) includes the steps of:

20 (i) determining whether the receiving mobile terminal has subscribed multi-hop communication services; and

(ii) if the receiving mobile terminal has subscribed the multi-hop communication services, determining whether the receiving mobile terminal is suitable for using the multi-hop communication services.

13. The method of claim 11, further comprising the step of:

25 if the receiving mobile terminal is in a prompt mode for multi-hop communication, sending a prompt to the receiving mobile terminal for selection of

the multi-hop communication services, along with information about incentives for using the services.

14. The method of claim 13, wherein step (d) includes the step of:

5 if the receiving mobile terminal in the prompt mode selects the multi-hop communication services, allocating resources for setting up a multi-hop communication link between the receiving mobile terminal and the system.

15. The method of claim 11, 12, 13 or 14, further comprising the step of:

10 after the multi-hop communication is completed, recording information relating to the multi-hop communication services for the receiving and relaying mobile terminals in at least one of a home location register and a visitor location register.

16. The method of claim 15, further comprising the step of:

15 after the multi-hop communication is completed, sending discounted billing information to the receiving mobile terminal and incentive information to the relaying mobile terminals.

20 17. The method of claim 13, further comprising the step of providing conventional communication services to the receiving mobile terminal, if the receiving mobile terminal cannot use multi-hop communication services, the relaying cannot be provided, or the receiving mobile terminal in the prompt mode fails to select the multi-hop communication services.

18. The method of claim 13, further comprising the step of calculating the incentives to the receiving mobile terminal based on statistical benefits resulting from at least one of an increase in system capacity and an decrease in overall interference.

25 19. The method of claim 13, further comprising the step of calculating the incentives to the receiving mobile terminal based on the number of hops used to support the multi-hop communication link.

20. The method of claim 13, further comprising the step of calculating the incentives to the receiving mobile terminal in accordance with actual traffic load conditions and interference for a predetermined time duration.

21. A method performed by a mobile terminal, comprising the steps of:

5 (a) checking whether there is a request from a wireless communication system for providing relaying in multi-hop communication;

(b) if there is a request for relaying, determining a relaying mode of the mobile terminal for multi-hop communication;

10 (c) if the mobile terminal is in a prompt relaying mode, checking whether a prompt for relaying has been received from the wireless communication system;

(d) if the prompt has been received, determining whether a user of the mobile terminal has chosen to provide relaying; and

(e) if the user has chosen to provide the relaying, providing the relaying.

15 22. The method of claim 21, further comprising the step of, if the mobile terminal is in a default mode, providing the relaying.

23. The method of claim 21 or 22, further comprising the step of, before step (a), checking whether the mobile terminal is in an idle mode; and wherein step (a) is performed if the mobile terminal is in an idle mode.

24. The method of claim 21 or 22, further comprising the steps of:

20 before step (a) determining whether the mobile terminal is in a disabled relaying mode; and

if the mobile terminal is in the disabled relaying mode, rejecting any request for relaying.

25 25. A wireless communication system capable of managing multi-hop communications, comprising:

means for receiving a request from an originating mobile terminal for initiating a call to a receiving mobile terminal;

means for determining whether the originating mobile terminal can use multi-hop communication services;

5 means for determining an operating mode of the originating mobile terminal for multi-hop communication;

means for determining whether relaying can be provided by one or more relaying mobile terminals for multi-hop communication by the originating mobile terminal; and

10 means for establishing multi-hop communication between the originating mobile terminal and the system;

wherein the establishing means establishes the multi-hop communication if the originating mobile terminal can use the services, the originating mobile terminal is in the default mode, and the relaying can be provided.

15 26. The system of claim 25, wherein whether the originating mobile terminal can use multi-hop communication services is determined based on whether the originating mobile terminal has subscribed multi-hop communication services and whether the originating mobile terminal is suitable for using the multi-hop communication services.

20 27. The system of claim 25, further comprising means for sending; wherein if the originating mobile terminal is in a prompt mode for multi-hop communication, the sending means sends a prompt to the originating mobile terminal for selection of the multi-hop communication services, along with information about incentives for using the services.

25 28. The system of claim 27, wherein the establishing means includes means for allocating resources, and wherein if the originating mobile terminal in the prompt mode selects the multi-hop communication services, the allocating

means allocates resources for setting up a multi-hop communication link between the originating mobile terminal and the system.

29. The system of claim 25, 26, 27 or 28, further comprising means for recording; wherein after the multi-hop communication is completed, the recording
5 means records information relating to the multi-hop communication services for the originating and relaying mobile terminals in at least one of a home location register and a visitor location register.

30. The system of claim 27, wherein after the multi-hop communication is completed, the sending means sends discounted billing information to the
10 originating mobile terminal and incentive information to the relaying mobile terminals.

31. The system of claim 27, further comprising means for calculating the incentives to the originating mobile terminal based on statistical benefits resulting from at least one of an increase in system capacity and an decrease in overall
15 interference.

32. The system of claim 27, further comprising means for calculating the incentives to the originating mobile terminal based on the number of hops used to support the multi-hop communication link.

33. The system of claim 25, 26, 27, 28, 30, 31 or 32, wherein the three
20 determining means respectively determines:

whether the receiving mobile terminal can use multi-hop communication services;

an operating mode of the receiving mobile terminal for multi-hop communication; and

25 whether relaying can be provided by one or more relaying mobile terminals for multi-hop communication by the receiving mobile terminal; and

wherein the establishing means establishes the multi-hop communication between the receiving mobile terminal and the system if the receiving mobile terminal can use the services, the receiving mobile terminal is in the default mode, and the relaying can be provided.